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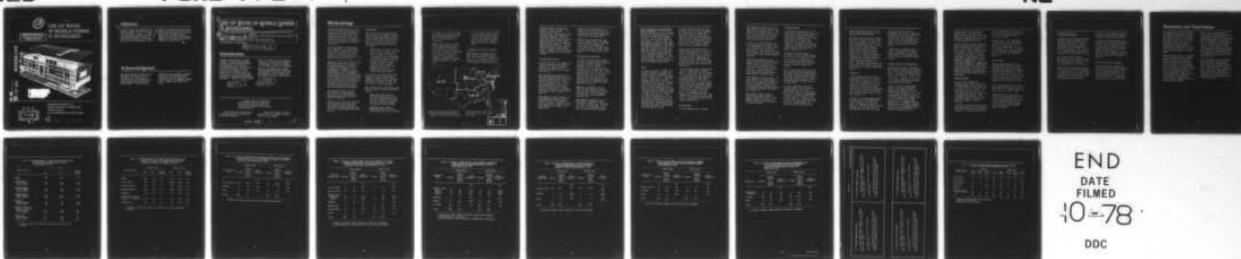
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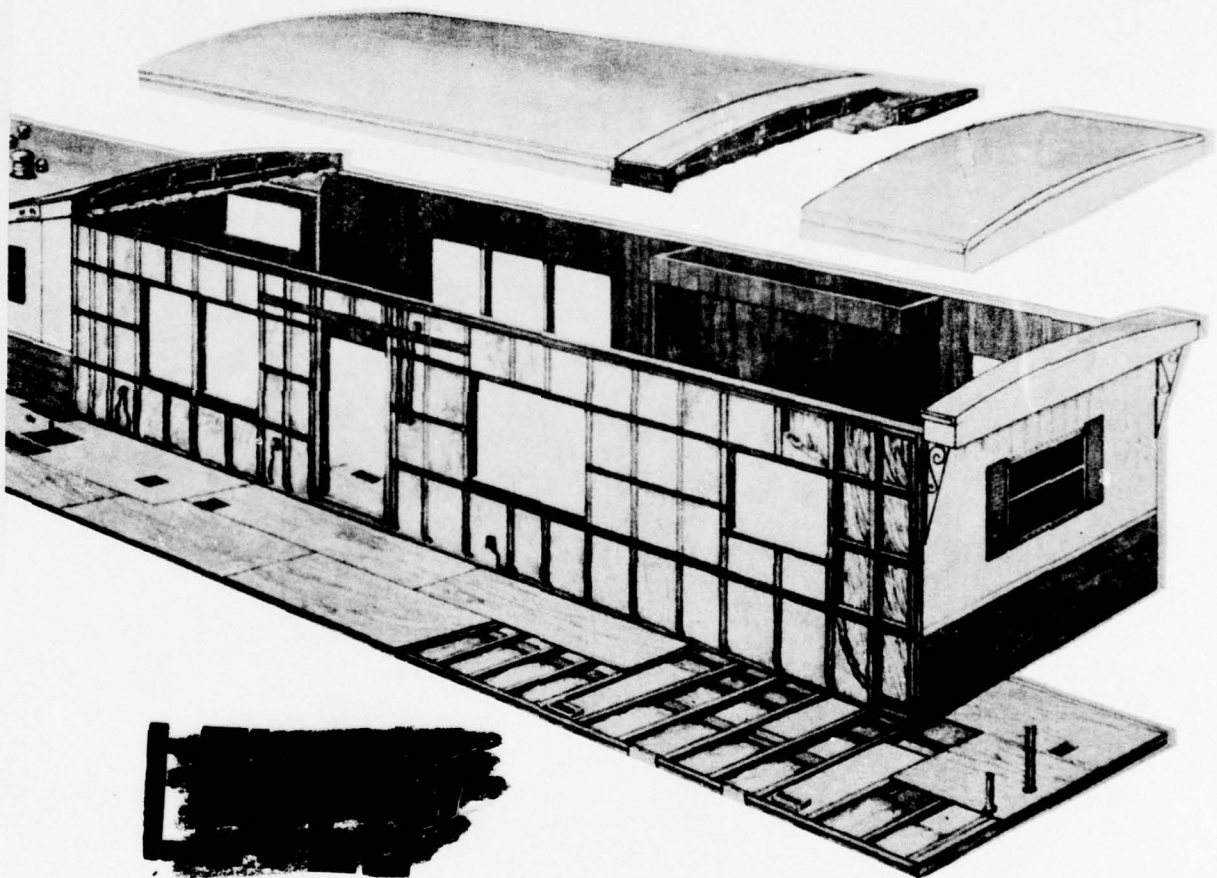
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Abstract

In recent years increased amounts of dimension lumber have been used per mobile home unit. This is a result of increasingly stringent construction standards adopted during the mid-1970's and because the average size per unit has increased. The

demand for conventional exteriors in double-wide mobile homes has brought about large increases in the use of softwood and hardwood plywood. Gypsum board has been used increasingly as an alternative to hardwood plywood for interior walls.

Acknowledgment

The author thanks the staff of the Manufactured Housing Institute, Arlington, Va., for advice and assistance and plant managers and other corporation officials who provided data. The author also

thanks Edward W. Whitehorn, Computer Specialist, Southeastern Forest Experiment Station, Raleigh, N.C., for his work on the computer program used to compile and analyze the data.

6 USE OF WOOD IN MOBILE HOMES IS INCREASING.

10 By H. EDWARD DICKERHOOF^{1/}

Forest Products Laboratory,^{2/} Forest Service
U.S. Department of Agriculture

9 Forest Service resource bulletin,

14 FSRB-FPL-4

Introduction

The mobile home industry, a major consumer of lumber and wood-panel products, has recently altered and increased many of its material requirements because (a) units must be built according to new code specifications similar to those required for site-built homes, and (b) the units are generally larger and often of conventional design and appearance. Because of these develop-

ments, the Forest Service conducted a survey of all mobile home manufacturing plants to determine changes in wood product material requirements.

Specific information about lumber and wood and nonwood panel products was requested for mobile home units manufactured in 1974. Comparisons were made with similar data obtained for 1970 (1).^{3/}

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^{1/} This study was initiated at the Southeastern Forest Experiment Station while the author was stationed at the Forest Sciences Laboratory, Athens, Ga.

^{2/} The Laboratory is maintained in cooperation with the University of Wisconsin-Madison.

^{3/} Underlined numbers in parentheses refer to Literature Cited at the end of the report.

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Methodology

A questionnaire was mailed in late 1975 to all mobile home manufacturing plants in the United States to secure data for 1974. These questionnaires were returned in late 1975 and early 1976. Subsequently, followups were made by telephone to many of the respondents to clarify information.

Data were sought for only single-wide, expandable, and double-wide mobile homes. Plants that manufactured some combination of mobile, modular, or sectional homes were asked to report information for only their mobile home type units.

Because of the 1974 to 1975 recession, many mobile home plants closed either temporarily or permanently. By combining information from a subsample of telephone calls to nonrespondents, from our returned questionnaire, and from changes in plant directories, we estimated that of approximately 665 plants operating at the close of 1974 only about 450 were operating when we conducted the survey in the fall of 1975 (10,12). One hundred sixty-five of these surviving plants furnished usable data for computation and analysis.

The responding plants produced 94,470 units, or approximately 29 percent of the 330,800 mobile homes manufactured in the United States in 1974 (11).

Separate sets of data were requested for single-wide and double-wide units because double-wides have accounted for approximately 25 percent of all units manufactured since 1973 (6).

Terminology

The classification of manufactured housing units is becoming difficult because increasing numbers of these units resemble traditional housing units in construction, appearance, and size. The definition used by the Manufactured Housing Institute (6) states:

Mobile Home--A structure transportable in one or more sections, which exceeds either 8 body feet in width or 32 body feet in length, built on a permanent chassis and designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air-conditioning, and electrical systems contained therein.

The definition of the Bureau of the Census for a mobile home differs somewhat from that of the Institute. The Bureau's definition states the unit must be "10 feet or more wide and 35 feet or more long" (15).

Other definitions by the Manufactured Housing Institute include the following (6):

Double-Wide Mobile Home--A mobile home consisting of two sections combined horizontally at the site while still retaining their individual chassis for possible future movement.

Expandable Mobile Home--A mobile home with one or more room sections that fold, collapse,

Modular Unit--A factory fabricated transportable building unit designed to be used by itself or to be incorporated with similar units at a building site into a modular structure to be used for residential, commercial, educational, or industrial purposes. A modular unit may be built to local codes.

Sectional Home--A dwelling made of two or more modular units factory fabricated and transported to the home site where they are put on a foundation and joined to make a single house.

Approximately 50 percent of all mobile home units manufactured in 1974 were produced in the South (fig. 1). Six states accounted for approximately 48 percent of total U.S. production. These states, in

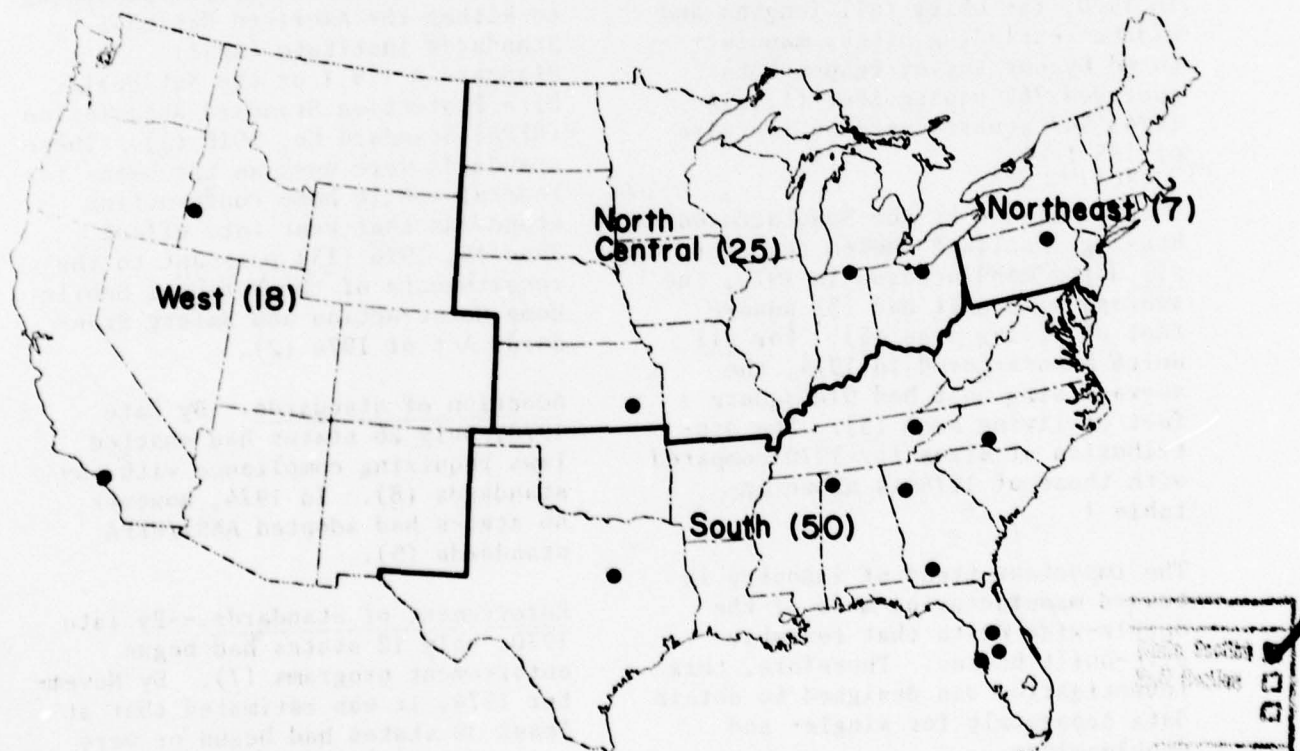


Figure 1.--Percent (in parentheses) of mobile homes manufactured by region and location of major manu-

facturing centers (0) in the 12 most productive states, 1974.
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descending order of production output: Georgia, Indiana, Texas, California, Florida, and North Carolina. Mobile home plants and their suppliers tended to be clustered in specific localities where they could interact with each other and draw on a labor supply familiar with a plant's particular manufacturing techniques. Several companies had one or more plants in each of the major manufacturing centers. Plants in all of the major centers responded to our 1975 questionnaire.

Size and Type of Units

In 1970, the units (all lengths and widths--excluding hitch) manufactured by our survey respondents averaged 762 square feet (1); in 1974, 947 square feet--an increase of 185 feet.

Data published by the Manufactured Housing Institute showed that for all units manufactured in 1970, the average size unit had 732 square feet of living area (5). For all units manufactured in 1974, the average size unit had 910 square feet of living area (5). The distribution of sizes for 1970 compared with those of 1974 is shown in table 1.

The important trend of industry is toward manufacturing more of the double-wide units that resemble site-built houses. Therefore, this investigation was designed to obtain data separately for single- and double-wides.

Because so few expandables were reported and were only about 1 percent of total production, they were grouped with the single-wides and will not be discussed further.

Double-wides averaged much larger than did single-wides. The single-wides averaged 817 square feet in floor area; the double-wides, 1,340 square feet. This was almost as large as site-built homes, which averaged 1,695 square feet in 1974 (14).

Building Codes--Standards

In 1974, 46 states required mobile home units be manufactured according to either the American National Standards Institute (ANSI) Standard A 119.1 or the National Fire Protection Standard Association (NFPA) Standard No. 501B (5). These standards were used as the basis for Federal mobile home construction standards that went into effect June 15, 1976 (13) pursuant to the requirements of the National Mobile Home Construction and Safety Standards Act of 1974 (2).

Adoption of standards.--By late 1970, only 26 states had enacted laws requiring compliance with any standards (8). In 1974, however, 46 states had adopted ANSI/NFPA standards (5).

Enforcement of standards.--By late 1970, only 12 states had begun enforcement programs (7). By November 1974, it was estimated that at least 38 states had begun or were maintaining enforcement programs.

Mobile home production and enforcement of standards.--In 1970, only about 47 percent of all mobile homes produced were manufactured in states with active enforcement programs (7,9,11). By 1974, approximately 93 percent of all mobile homes were manufactured in states with active enforcement programs for their ANSI and NFPA-501B standards. Thus these 1974 data on wood use reflect the important changes in building code standards that have occurred since 1970. Because the ANSI Standard A 119.1 and NFPA Standard No. 501B and the Federal standards are essentially the same, our survey data should strongly reflect current wood use in the mobile home industry.

Lumber

In 1970, the amount of lumber used per mobile home (all lengths and widths) averaged 1,680 board feet, about 2.2 board feet for each square foot of living area (1). (Average amounts of materials reported throughout this paper were computed by dividing total amounts of materials used in all units by total number of mobile home units.) By 1974, the amount of lumber used had increased to 2,520 board feet, about 2.7 board feet for each square foot of living area (table 2). The increase in lumber used is due in part to the increased size of the average mobile home unit; however, the increase on a square-foot basis indicates that larger framing members were used with closer spacing of joists and wall studs.

For single-wides in 1974, on the average, 2,255 board feet of lumber were used, about 2.8 board feet for each square foot of living area (table 3). This was about 50 percent more than used for single-wide units in 1970. Approximately 75 percent of the floor joists in single-wides were 2 by 6's with 2 by 4's for most of the remaining volume.

Exterior wall studs were often larger than those used for interior walls; 90 percent were 2 by 4's. A variety of dimensions was reported for interior wall studs; 2 by 3's were most popular. Approximately 50 percent of the roof rafters and trusses was from 2 by 2's; the other 50 percent from a great variety of lumber sizes.

In 1974, double-wides on the average used 3,317 board feet of lumber, about 2.5 board feet for each square foot of living area. This was only 11 percent more than that required for double-wides in 1970 (table 3). Almost 90 percent of the floor joists were 2 by 6's. As in single-wides, studs were frequently larger in exterior walls than those used in interior walls. Ninety-six percent of the interior wall studs were 2 by 3's; 26 percent, 2 by 4's. Most of the remainder was split between 2 by 2's and 1 by 3's. Roof rafters and trusses were often from 2 by 2's, with 2 by 3's and 2 by 4's popular alternatives.

Particleboard

In 1970, manufacturers reported

557 square feet (3/4-in. basis) of particleboard used for units of all types, or 0.73 square foot for each square foot of living area (1). In 1974, this increased to 862 square feet (3/4-in. basis) per unit, or 0.89 square foot for each square foot of living area (table 2).

In 1970, on a surface-measure basis (all thicknesses), 702 square feet of particleboard were used per unit (1). In 1974, this increased by 49 percent to 1,047 square feet. In both surveys, 5/8-inch particleboard was by far the most common thickness reported.

The 1974 particleboard data for single- and double-wides showed that single-wides used 757 square feet (3/4-in. basis); double-wides, 1,179 square feet (3/4-in. basis) (table 4). For each square foot of floor area, single-wides used 0.93 square foot of particleboard; double-wides, 0.88 square foot.

Particleboard was used primarily for floor decking. In single-wides, 90 percent of the particleboard used was for floor decking; in double-wides, 92 percent. Almost all of the remaining particleboard was used in cabinets, shelving, and counter-tops (table 4).

Quantities of floor decking of particleboard began to replace plywood in the late 1960's. Plant managers showed no indication of dissatisfaction with particleboard or plans to change.

Softwood Plywood

In 1970, mobile home units of all types used, on the average, 364 square feet (3/8-in. basis) of softwood plywood, 0.48 square foot for every square foot of living area (1). In 1974, units of all types used 444 square feet (3/8-in. basis) (table 2). Although total softwood plywood use increased per unit, the use per square foot remained an almost constant 0.47.

In 1970, on a surface basis, 267 square feet of softwood plywood were used, on the average, per unit for all units (1) compared with 410 square feet in 1974 (table 2). Our 1970 data showed that 5/8-inch material was most commonly preferred.

The 1974 data indicate that preferences differed between single-wides and double-wides in softwood plywood thickness. Although several different thicknesses are used in single-wides, more than 50 percent of all softwood plywood in double-wides was 3/8 inch thick.

In 1974, single-wides used only 174 square feet (3/8-in. basis) of softwood plywood in contrast to double-wides that used 1,258 square feet (3/8-in. basis). Approximately 56 percent of the softwood plywood in double-wides was used for roof decking (table 5). Other major uses were for roof ridge beams and exterior walls. Ridge beams of the design recently developed by the

American Plywood Association have found widespread acceptance in the manufacture of double-wides.

The mobile home industry is making an effort to build its units so that they not only meet site-built construction standards, but also look like site-built houses (4). As this trend continues, more softwood plywood will likely be used for exterior walls and roof decking. Double-wides already use large quantities of softwood plywood roof decking, which reflects consumer preference for shingled-gable roofs rather than metal-covered flat roofs. The author observes on dealer lots and at mobile home shows that similar roof design preferences are growing for 14-foot, single-wide models.

Hardboard

Little hardboard was utilized in mobile homes in 1970 (1); a modest increase was recorded in 1974. In 1970, only 168 square feet (1/8-in. basis), 0.22 square foot for each square foot of living area, was reported for units of all types (1). In 1974, this increased to 418 square feet (1/8-in. basis), 0.44 square foot for each square foot of living area (table 2).

In 1970, on a surface-measure basis, 115 square feet of hardboard were used for units of all types (1) versus 155 square feet in 1974 (table 2). The most common thickness reported was 7/16 inch. Most of this material was used for siding.

Single-wides used a total of 275 square feet (1/8-in. basis) of hardboard; double-wides, 848 square feet (1/8-in. basis) (table 6). Single-wides used 0.34 square foot (1/8-in. basis) of hardboard per square foot of living area; double-wides, 0.63 square foot (1/8-in. basis).

A comparison of hardboard uses in single- and double-wides shows siding an important use for both types (table 6), but double-wides used more than three times as much siding.

Hardwood Plywood or Gypsum Board

Hardwood plywood has traditionally been the most commonly used material for interior wall surfaces of mobile homes. Occasionally hardboard was used as a feature wall in the living-dining area. However, in the last 2 or 3 years, gypsum board has been increasingly used instead of hardwood plywood wall paneling.

A major reason for using gypsum board is its good performance against fire compared to that of hardwood paneling, which is not fire-retardant treated. Due to HUD flame-spread ratings required for furnace and water heater spaces and for "exposed interior finishes adjacent to the cooking range," gypsum board is commonly installed. Specifically, the Federal standard requires "5/16-inch gypsum board or material having equivalent fire protective properties" (3).

Several plants reported they use gypsum board on all mobile home interior walls. At least one of the major mobile home manufacturers has changed to gypsum board exclusively instead of hardwood paneling.

Despite efforts to develop improved mobile home gypsum board, unofficial reports persist that gypsum board panels often crack in transport from the factory to dealer, from dealer to consumer, or from both, which results in some dealer resistance to the product. Nevertheless, this technical problem will be overcome. Apparently, gypsum board will be used more frequently as a substitute for hardwood paneling. Gypsum board could very well be substituted for hardwood plywood if fire performance studies in progress contribute to the conclusion that hardwood plywood should not be used in mobile home manufacture.

Hardwood Plywood

In 1970, mobile homes used 936 square feet (3/8-in. basis) of hardwood plywood on the average, or 1.2 square feet for each square foot of living area (1); in 1974, 1,097 square feet (3/8-in. basis), or 1.1 square feet for each square foot of living area (table 2). Thus, although total volume per unit increased slightly, use per square foot of living area slightly declined.

In 1970, on a surface-measure basis, the average unit used 1,773 square feet (1); in 1974, 2,123 square feet (table 2). In 1970, the most com-

monly used thicknesses were 5/32, 3/16, and 1/4 inch (1); in 1974, for both single- and double-wides, 5/32 and 1/4 inch.

A comparison of total quantities used in single- and double-wides showed 1,017 square feet (3/8-in. basis) for single-wides and 1,336 square feet (3/8-in. basis) for double-wides. More than 90 percent of all hardwood plywood used was for interior wall paneling (table 7).

Gypsum Board

Because gypsum board has only recently been introduced in mobile home construction, few data are available for comparative purposes. Several manufacturers were involved in tests and evaluations of the board in 1973; by 1974, mobile homes contained 280 square feet (1/2-in. basis) for 0.30 square foot per square foot of living area (table 2).

On a surface-measure basis, mobile homes contained 369 square feet in 1974 (table 2). Common thicknesses were 5/16, 3/8, and 1/2 inch.

Gypsum board was used in both single- and double-wide units; but more often on ceilings than on walls. More gypsum board was used in single-wides--324 square feet (1/2-in. basis)--than in double wides--149 square feet (1/2-in. basis) (table 8).

Insulation Board and Acoustical Fiberboard

The data from the 1974 questionnaire revealed that mobile homes of all types contained, on the average, 818 square feet (1/2-in. basis) of insulation board and acoustical fiberboard, which is 0.86 square foot for each square foot of living area. The 1970 survey obtained no information for these materials (1).

On a surface-measure basis, 849 square feet of insulation board and acoustical fiberboard were used per unit (table 2). Most was 1/2-inch-thick material (table 9).

Double-wides required more insulation board and acoustical fiberboard per square foot of floor area than did single-wides. For double- and single-wides, the main use of these materials (primarily acoustical fiberboard) was for ceilings

(table 9). The primary alternative was gypsum board, which is likely to continue to penetrate this market.

Because of the heat transmission requirements of the Federal standard and the increased public awareness of the value of insulation, this product should be used increasingly in the next few years (3). In addition, states might also impose high insulation standards that would increase insulation requirements further.

Panel Product Share of Market

Data from 1974 were compiled to determine the share of the market of various panel products that compete for use in major components of mobile homes--products for floors, interior and exterior walls, and ceilings (table 10). Comparable data were not available for 1970.

Summary and Conclusions

The adoption of building standards for mobile homes similar to site-built homes--particularly structural standards--is a major reason much more lumber was used in 1974 than was used in 1970. The increased proportion of double-wides to single-wides and the increased percentage of single-wides 14 feet wide have also resulted in the use of an increased amount of framing lumber.

Gypsum board was used as an alternative to hardwood plywood although hardwood plywood was still the dominant interior wall covering. Due to the Federal standards that went into effect in 1976, gypsum board is required in furnace areas and in certain kitchen areas because of its fire-resistant qualities. Even more stringent Federal and state standards now under consideration could result in greatly increased use of gypsum board to replace hardwood plywood that is not fire-retardant treated.

Much of the softwood plywood in double-wides has been used for roof decking and in the manufacture of ridge beams designed for double-wide gable roof systems. Large quantities of hardboard have been used for exterior siding in double-wides as well as in single-wides. These trends in uses of materials reflect an accelerating effort by the mobile home industry to improve the exterior appearance of mobile home units and to meet higher structural standards as well.

By the mid-1980's, mobile, modular, and conventional homes may not differ greatly. The nationwide adoption of new building standards has lessened differences in structure, and differences in appearance are disappearing. Regardless whether they are called "mobile" or "manufactured" homes, they will continue to be an important market for wood products.

Literature Cited

1. Fasick, Clyde A.,
H. Edward Dickerhoof, and
J. Dewel Lawrence.
1973. Evaluation of the use
of wood products in mobile
home manufacture. Forest
Prod. J. 23(6):11-16.
2. Federal Register.
1975. Part II: Department
of Housing and Urban Develop-
ment. Mobile homes. Federal
Construction and Safety
Standards 40(170):40261-40303.
3. Federal Register.
1975. Part II: Department of
Housing and Urban Development.
Mobile Construction and Safety
Standards 40(244):58752-58792.
4. House and Home.
1975. Mobile-home men try a
comeback with builder's house
look-alikes. House and Home
47(48):16.
5. Manufactured Housing Institute.
1975. Quick facts about the
manufactured housing industry.
12 p. Arlington, Va. (June).
6. Manufactured Housing Institute.
1975. Quick facts about the
manufactured housing industry.
12 p. Arlington, Va (Nov.).
7. Manufactured Housing Institute.
1976. State requirements for
mobile home standards ANSI/
NFPA. 501B. 2 p.
Arlington, Va.
8. Mobile Homes Manufacturers
Association.
1971. Flash facts on mobile,
sectional, and modular homes.
10 p. Arlington, Va.
9. Mobile Homes Manufacturers
Association.
1972. 1971 Annual report.
Mobile home shipments and
production by states. 9 p.
Arlington, Va.
10. Mobile Homes Manufacturers
Association.
1974. Mobile Homes Manufac-
turers Association directory.
43 p. Arlington, Va.
11. Mobile Homes Manufacturers
Association.
1975. 1974 Mobile home data
book. 23 p. Arlington, Va.
12. Mobile-Modular Housing Dealer.
1974. 19th Annual directory
and buyer's guide. 227 p.
Chicago, Ill. (Dec.).
13. Mobile-Modular Housing Dealer.
1976. Capital comments
28(2):16,21.
14. U.S. Department of Commerce,
Bureau of Census
1975. Construction Reports--
Series C25. Characteristics
of new one-family homes, 1974.
147 p.
15. U.S. Department of Commerce,
Bureau of Census.
1977. Construction Reports--
Series C20. Housing starts,
February 1977. 25 p. (Apr.).

Table 1.--Type and width of mobile home units produced by sample respondents and all manufacturers in continental United States, 1970 and 1974

Type and width	1970 ^{1/}		1974	
	Sample respondents	All manufacturers	Sample respondents ^{2/}	All manufacturers ^{3/}
	Pct	Pct	Pct	Pct
Single-wides:				
12-foot	78	78	34	42
14-foot	10	8	41	32
Other	1	1	(4)	1
Subtotal	89	87	75	75
Expandables	3	3	(4)	1
Double-wides:				
24-foot	(5)	(5)	22	22
Other	(5)	(5)	(5)	2
Subtotal	8	10	25	24
Total	100	100	100	100

1/ Source: Fasick, Clyde A., H. Edward Dickerhoof, and J. Dewel Lawrence. Evaluation of the use of wood products in mobile home manufacture (1).

2/ Data by author.

3/ Source: Mobile Homes Manufacturers Assoc., 1974 Mobile home data book (12).

4/ Less than 1/2 of 1 percent.

5/ No data.

Table 2.--Average amounts^{1/} of lumber and board products used
in mobile home units and percent change in
material usage, 1970-1974

Materials used	Year		Percent change
	1970	1974	
Lumber	1,680	2,520	+ 50
Particleboard			
Surface measure	702	1,047	+ 49
3/4-in. basis	557	862	+ 55
Softwood plywood			
Surface measure	267	410	+ 54
3/8-in. basis	364	444	+ 22
Hardwood plywood			
Surface measure	1,773	2,123	+ 20
3/8-in. basis	936	1,097	+ 17
Hardboard			
Surface measure	115	155	+ 35
1/8-in. basis	168	418	+149
Insulation board and acoustical fiberboard			
Surface measure	(2)	849	(2)
1/2-in. basis	(2)	818	(2)
Gypsum board			
Surface measure	(2)	369	(2)
1/2-in. basis	(2)	280	(2)

^{1/} Lumber is shown in board feet; other materials in square feet.

^{2/} No data.

Table 3.--Average amounts^{1/} of lumber and board products used per unit in single- and double-wide mobile home manufacture and percent changes, 1970-1974

Materials used	Single-wides			Double-wides		
	1970	1974	Percent change	1970	1974	Percent change
Lumber	1,502	2,255	+50	2,991	3,317	+11
Particleboard	693	918	+33	1,009	1,433	+42
Softwood plywood	181	180	- 1	693	1,108	+60
Hardwood plywood	1,648	1,997	+21	2,809	2,503	-11
Hardboard	98	107	+ 9	222	299	+35
Insulation board and acoustical fiberboard	(2)	663	(2)	(2)	1,412	(2)
Gypsum board	(2)	425	(2)	(2)	201	(2)

^{1/} Lumber in board feet; others in square feet of surface measure.

^{2/} No data.

Table 4.--Percent, average amount, and usual thickness of particleboard used per unit for selected purposes in single- and double-wide mobile home manufacture, 1974

Particleboard uses	Single-wides			Double-wides		
	Percent	Square foot per unit (3/4-in. basis)	Usual thickness ^{1/}	Percent	Square foot per unit (3/4-in. basis)	Usual thickness ^{1/}
			In.			In.
Floor decking	90	678	5/8	92	1,085	5/8
Cabinets	8	63	5/8	7	77	5/8
Other	2	16	3/8	1	17	3/8
Totals	100	757		100	1,179	

^{1/} Based on largest volume of material reported by thickness.

Table 5.--Percent, average amount, and usual thickness of softwood plywood used per unit for selected purposes in single- and double-wide mobile home manufacture, 1974.

Softwood plywood uses	Single-wides			Double-wides		
	Percent	Square foot per unit (3/8-in. basis)	Usual thickness ^{1/}	Percent	Square foot per unit (3/8-in. basis)	Usual thickness ^{1/}
			In.			In.
Floor decking	14	24	5/8	9	113	5/8
Interior walls	22	38	1/4	1	13	(2)
Exterior walls						
Sheathing	20	35	5/16	7	88	3/8
Siding	2	3	5/8	5	63	3/8
Cabinets	6	10	1/4	1	13	1/4
Ridge beams	2		5/8	19	239	5/8
Roof decking	29	51	3/8	56	704	3/8
Other	5	9	1/2	2	25	5/8
Total	100	174		100	1,258	

^{1/} Based on largest volume of material reported by thickness.

^{2/} Data omitted to avoid disclosure of proprietary information.

Table 6.--Percent, average amount, and thickness of hardboard used per unit for selected purposes in mobile home manufacture, 1974

Hardboard uses	Single-wides			Double-wides		
	Percent	Square foot per unit (1/8-in. basis)	Usual thickness ^{1/}	Percent	Square foot per unit (1/8-in. basis)	Usual thickness ^{1/}
			<u>In.</u>			<u>In.</u>
Interior walls						
Bath	17	47	3/16	6	51	3/16
Kitchen	5	14	1/4	2	17	3/16
Other	9	25	1/4	15	127	1/4
Cabinets	2	5	3/16	1	8	1/8
Siding	67	184	7/16	76	645	7/16
All other	<u>(2)</u>	<u>---</u>	<u>(3)</u>	<u>(2)</u>	<u>---</u>	<u>(3)</u>
Total	100	275		100	848	

^{1/} Based on largest volume of material reported by thickness.

^{2/} Less than 1/2 of 1 percent.

^{3/} Data omitted to avoid disclosure of proprietary information.

Table 7.--Percent, average amount, and usual thickness of
hardwood plywood used per unit for selected
purposes in mobile home manufacture, 1974

Hardwood plywood uses	Single-wides			Double-wides		
	Percent	Square foot per unit (3/8-in. basis)	Usual thickness ^{1/} In.	Percent	Square foot per unit (3/8-in. basis)	Usual thickness ^{1/} In.
Interior walls	93	946	5/32	94	1,256	5/32 1/4
Cabinets	6	61	5/32 1/4	5	67	5/32 1/4
Other	1	10	5/32	1	13	5/32 1/4
Total	100	1,017		100	1,336	

^{1/} Based on largest volume of material reported by thickness.

Table 8.--Percent, average amount, and usual thickness of gypsum board used per unit for selected purposes in mobile home manufacture, 1974.

Gypsum board uses	Single-wides			Double-wides		
	Percent	Square foot per unit (1/2-in. basis)	Usual thickness ^{1/}	Percent	Square foot per unit (1/2-in. basis)	Usual thickness ^{1/}
			In.			In.
Interior walls	34	110	3/8	13	19	1/2
Ceilings	64	207	5/16	81	121	3/8
Other	2	7	3/8	6	9	1/2
Total	100	324		100	149	

^{1/} Based on largest volume of material reported by thickness.

Table 9.--Percent, average amount, and usual thickness per unit of insulation board and acoustical fiberboard used for selected purposes in mobile home manufacture, 1974

Board uses	Single-wides			Double-wides		
	Percent	Square foot per unit (1/2-in. basis)	Usual thickness ^{1/}	Percent	Square foot per unit (1/2-in. basis)	Usual thickness ^{1/}
			In.			In.
Underfloor insulation	11	70	3/8	8	110	3/8
Ceilings	87	551	1/2	88	1,210	1/2
Other	2	13	3/8	4	55	3/8
Total	100	634		100	1,375	

^{1/} Based on largest volume of material reported by thickness.

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Table 10.--Percent of various panel products used per unit for selected components
in single- and double-wide mobile home manufacture, 1974

Materials used (surface measure)	Single-wides				Double-wides			
	Floor decking	Interior walls	Exterior walls ^{1/}	Ceilings	Floor decking	Interior walls	Exterior walls ^{1/}	Ceilings
Particleboard	98	(2)	(3)	(3)	94	(2)	(3)	(3)
Softwood plywood	2	2	40	(3)	6	2	41	(3)
Hardwood plywood	(3)	87	(3)	(3)	(3)	91	(3)	(3)
Gypsum board	(3)	7	(3)	33	(3)	1	(3)	12
Hardboard	(3)	3	45	(3)	(3)	4	48	(3)
Insulation board and acoustical fiberboard	(3)	1	15	67	(3)	2	11	88
Total	100	100	100	100	100	100	100	100

1/ Amounts of aluminum siding used were not obtained.

2/ Less than 1/2 of 1 percent.

3/ Material not used for this purpose.